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September 27, 2019

Chinny Esakkiperumal

Olin Corporation

3855 North Ocoee Street, Suite 200

Cleveland, TN 37312

Subject: Per- and Polyfluoroalkyl Substances (PFAS) Sampling Results
Olin Chemical Superfund Site, Wilmington, Massachusetts

Dear Mr. Esakkiperumal:

This letter report was prepared on behalf of Olin Corporation (Olin) by Wood Environment and Infrastructure Solutions Inc., (Wood) to summarize the findings of groundwater sampling in select wells for per- and polyfluoroalkyl substances (PFAS) at the Olin Chemical Superfund Site (Site) in Wilmington, Massachusetts. Sampling was conducted at the request of the United States Environmental Protection Agency (USEPA) to assess the potential presence of PFAS at the Site. Sampling was performed in accordance with the approved Remedial Investigation (RI) Work plan Addendum V, PFAS Sampling Plan dated May 23, 2019 (Wood, 2019). The sampled locations are shown on **Figure 1** and include:

- Six wells located in the vicinity of the four historical manufacturing areas,
- Two wells located downgradient in the northeast corner of the property
- One well located on the western side of the Containment Area
- Three multiport samples located within Dense Aqueous Phase Liquid (DAPL), diffuse and overlying groundwater in the Containment Area on-property DAPL pool, and
- One bedrock well located in the Containment Area.

Note, the approved sampling plan included the collection of groundwater PFAS samples from fourteen locations. However, one well, B-10, located in the middle of Plant B Production Area (**Figure 1**), could not be located and is presumed destroyed. B-10 is not part of routine monitoring activities and has not been sampled for over 8 years. Although B-10 could not be sampled, two other wells in the immediate vicinity and downgradient of B-10 (GW-16R; and GW-101) were sampled as part of this investigation – so absence of data from well B-10 does not present a data gap.

GROUNDWATER SAMPLING

On May 28 and 29, 2019, groundwater samples for PFAS analysis were collected using low-flow procedures outlined in the RI/Feasibility Study (FS) Work Plan. PFAS-specific sampling precautions as described in the PFAS Quality Assurance Project Plan (QAPP) Addendum were carried out throughout the sampling effort.

The depth to water was measured in each well prior to initiating sampling; because of the narrow diameter of the sampling ports, depth to water was not measured in multiport well MP-1. Field Data forms documenting the sampling at each well are provided in **Attachment A**. Decontamination of non-dedicated sampling and measuring devices was completed between sampling locations using PFAS-free water.

Samples were placed in a cooler, iced, and delivered using overnight courier to Eurofins Lancaster Laboratories Environmental for analysis of fourteen PFAS compounds using USEPA analytical method 537 Version 1.1 Modified.

RESULTS

A summary of the PFAS sampling results is provided in **Table 1.** Data validation was conducted in accordance with the QAPP. A subset of the data was qualified as estimated during validation; however, no data were rejected due to laboratory issues. A copy of the Data Validation Report is provided as **Attachment B** and laboratory data reports are provided in **Attachment C**.

None of the sampled locations had perfluorooctane sulfonate (PFOS) or perfluorooctanoic acid (PFOA) present at concentrations above the USEPA Health Advisory (HAs) and project action limits (PALs) outlined in the QAPP. Detected concentrations of PFOS and PFOA ranged from less than 1 nanograms per liter (ng/L) to a maximum of 8.4 ng/L. The HA for PFOS and PFOA is 70 ng/L (for individual compounds or combined where the compounds are detected in the same sample) and the PALs range from 40 to 4,000 ng/L. Overall, the detected concentrations were significantly less than the HAs and PALs. Note, one of the thirteen samples collected (OC-MP-1#1-XX) was analyzed by the laboratory at a reduced volume (with a dilution factor of 100X) due to matrix interference. PFAS compounds were not detected in this diluted analysis and the reporting limits were elevated accordingly. Olin instructed the laboratory to re-analyze the sample at a 25X dilution factor. PFAS compounds were not detected in the re-analysis performed on OC-MP-1#1-XX and the minimum detection levels reported by the laboratory were less than the PALs.

CONCLUSIONS & RECOMMENDATIONS

As requested by the USEPA, groundwater samples were collected for PFAS analysis at locations down gradient from former manufacturing areas that have shown evidence of historical site-related activities/impacts. Samples were also collected from within the containment area, from both the diffuse layer and within the DAPL overlying bedrock. Wells that were sampled for PFAS are installed in different aquifers (shallow overburden, deep overburden and shallow bedrock) providing a vertical evaluation of the aquifers for PFAS. Detected PFOS and PFOA concentrations (either individual or combined) at the thirteen sampling locations were significantly below USEPA HAs and PALs. Analysis of groundwater samples collected as part of this investigation does not indicate a source for PFAS, or PFAS impacts at the site. Therefore, it is recommended that no further sampling for PFAS compounds be conducted or is warranted for the Site.

Sincerely,

Wood Environment & Infrastructure Solutions, Inc.

Elizabeth T. Bowen
Associate Project Manager

Hank Andolsek
Senior Hydrogeologist

Copy: James Cashwell, Olin Corporation
Nelson Walter, Wood Environment and Infrastructure, Inc.

Attachments:

Figure 1 - PFAS Sampling Locations
Table 1 - Final Results Summary
Attachment A - Field Data Records
Attachment B - Data Validation Report
Attachment C - Laboratory Analytical Report

FIGURE

GW-32D
GW-32S
Former Plant B
Tank Farm
GW-101
Plant B
Production
Area
B-10
GW-16R
Plant B
Treatment Bldg.
Plant A
GW-54D
Plant C-1
Plant
C-2
Plant
C-3
GW-15
Plant D
Tank Farm
GW-305
Plant D
GW-307
GW-10DR
MP-1 #01
MP-1 #04
MP-1 #14
BR-1

Legend

- PFAS Sampling Locations
- B-10 - was destroyed and not sampled
- Containment Area
- 51 Eames St. Property Boundary
- Approximate DAPL Pool Boundary
- Water
- Wetland Boundary
- Railroad
- Paved Road
- Unpaved Road

Wood
Environment & Infrastructure Solutions
271 Mill Road
Chelmsford, MA 01824

N

0 120 240 Feet

Figure 1
PFAS Sampling Locations

Olin Chemical Superfund Site
Wilmington, Massachusetts

Prepared/Date: BRP 09/18/19 | Checked/Date: TC 09/18/19

TABLE

Table 1
Final Results Summary
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

					Lab Sample Delivery Group	2046067		2046067		2046067		2046067	
					Location	BR-1		GW-101		GW-15		GW-16R	
					Field Sample Date	5/28/2019		5/28/2019		5/28/2019		5/28/2019	
					Field Sample ID	OC-BR-1-XXX		OC-GW-101-XXX		OC-GW-15-XXX		OC-GW-16R-XXX	
					QC Code	FS		FS		FS		FS	
Method	**Fraction**	**Parameter**	**PALs**	**HAs**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7	U	2.5	U	2.7	U	2.6	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7	U	2.5	U	2.7	U	2.6	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	**0.78**	J	**0.76**	J	**0.99**		**0.83**	J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	**2.1**		**2.3**		**0.52**	J	**0.89**	
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	**1.1**	J	1.7	U	**0.44**	J	1.7	U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	**3.4**		**5.3**		**0.68**	J	**1.6**	J
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	**1.1**	J	**1.3**	J	1.8	U	**0.55**	J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	**6.4**		**5.1**		**3.5**		**2**	
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	**8.4**		**5.2**		**2.5**		**3.2**	
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.91	U	0.84	U	0.9	U	0.86	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.91	U	0.84	U	0.9	U	0.86	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.7	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 1
Final Results Summary
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

					Lab Sample Delivery Group	2046067		2046067		2046067		2046067		2046067	
					Location	GW-32D		GW-32S		GW-54D		GW-54D		QC	
					Field Sample Date	5/28/2019		5/28/2019		5/28/2019		5/28/2019		5/28/2019	
					Field Sample ID	OC-GW-32D-XXX		OC-GW-32S-XXX		OC-GW-54D-DUP		OC-GW-54D-XXX		OC-FB-052819	
					QC Code	FS		FS		FD		FS		FB	
Method	**Fraction**	**Parameter**	**PALs**	**HAs**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	**1.8**	J	2.7	U	2.7	U	2.7	U	2.6	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7	U	2.7	U	2.7	U	2.7	U	2.6	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	**0.87**	J	0.91	U	**0.49**	J	**0.54**	J	0.87	U
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8	U	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8	U	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	**1.4**		**0.45**	J	**1.1**	J	**1.1**	J	0.87	U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	**0.65**	J	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	**1.8**	J	1.8	U	**1.8**	J	**1.7**	J	1.7	U
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	**0.97**	J	1.8	U	**1**	J	**1.1**	J	1.7	U
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	**8.1**		**0.51**	J	**1.5**	J	**1.6**	J	1.7	U
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	**5**		**1.7**		**2.2**		**2.4**		0.87	U
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.9	U	0.91	U	0.89	U	0.89	U	0.87	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.9	U	0.91	U	0.89	U	0.89	U	0.87	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8	U	1.8	U	1.8	U	1.8	U	1.7	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 1
Final Results Summary
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

					Lab Sample Delivery Group	2046391		2046391		2046391		2046391	
					Location	GW-10DR		GW-305		GW-307		MP-1 #04	
					Field Sample Date	5/29/2019		5/29/2019		5/29/2019		5/29/2019	
					Field Sample ID	OC-GW-10DR-XXX		OC-GW-305-XXX		OC-GW-307-XXX		OC-MP-1#4-XXX	
					QC Code	FS		FS		FS		FS	
Method	**Fraction**	**Parameter**	**PALs**	**HAs**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7	U	2.6	U	2.7	U	2.7	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7	U	2.6	U	2.7	U	2.7	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	**0.7**	J	**0.55**	J	**1.2**		**0.42**	J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	**1.8**		**1.3**		**1.9**		0.9	U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	**0.38**	J	1.7	U	1.8	U	**0.61**	J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	**1.7**	J	**1.2**	J	**2.5**		**2.4**	
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	**1**	J	**0.69**	J	**1.1**	J	**0.82**	J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	**1.6**	J	**1.7**	J	**2.8**		**4.8**	
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	**6.4**		**2.9**		**5.4**		**11**	
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.89	U	0.86	U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.89	U	0.86	U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8	U	1.7	U	1.8	U	1.8	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 1
Final Results Summary
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

					Lab Sample Delivery Group	2046391		2052690	
					Location	MP-1 #14		MP-1 #01	
					Field Sample Date	5/29/2019		5/29/2019	
					Field Sample ID	OC-MP-1#14-XXX		OC-MP-1#1-XXX	
					QC Code	FS		FS	
Method	**Fraction**	**Parameter**	**PALs**	**HAs**	**Units**	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7	U	75	UJ
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7	U	75	UJ
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	**0.82**	J	25	UJ
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8	U	50	UJ
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8	U	50	UJ
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	**1.5**		25	UJ
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	**0.47**	J	50	UJ
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	**2**		50	UJ
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	**1.2**	J	50	UJ
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	**2.8**		50	UJ
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	**5.1**		25	UJ
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.9	U	25	UJ
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.9	U	25	UJ
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8	U	50	UJ

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Created by: KMS 8/15/19
Checked by: EAP 8/15/19

ATTACHMENT A
FIELD DATA RECORDS

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: BR-1
COMPREHENSIVE ROUND
SAMPLE ID: OC-BR-1-XXX
SITE TYPE: Superfund
DATE: 5/29/19
TIME START: 1630 END: 1733
JOB NUMBER: 6107190016
BOTTLE TIME: 1730

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: MD
MEASUREMENT POINT: [X] TOP OF WELL RISER [X] TOP OF PROTECTIVE CASING [ ] OTHER
PROTECTIVE CASING STICKUP (FROM GROUND): 2.3 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 1-2.0 1-9 FT.
INITIAL DEPTH TO WATER: 8.20 FT.
WELL DEPTH (TOR): 51.9 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 4 IN.
FINAL DEPTH TO WATER: 10.00 FT.
SCREEN LENGTH: Open FT.
PID WELL MOUTH: N/A PPM
WELL INTEGRITY: CAP YES X NO — N/A —; CASING YES X NO — N/A —; LOCKED COLLAR YES X NO — N/A —
DRAWDOWN VOLUME: 0.17 GAL. (final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI
TOTAL VOL. PURGED: 1.68 GAL. (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
0.09
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1631	Below Pump									
1642	8.40	225	11.16	24100	13.10	7.22	1.25	-30.0	46	
1647	8.23	200	11.41	21822	13.19	5.64	1.93	-39.4	46	
1654	8.54	200	11.32	20354	13.27	6.78	1.93	-33.1	46	Rate - 150
1659	8.90	150	11.26	20062	13.29	6.81	1.42	-31.1	46	
1705	9.21	150	11.02	19847	13.32	6.80	1.07	-27.3	46	
1710	9.45	150	10.98	19692	13.34	7.62	1.11	-24.8	46	
1715	9.90	150	10.83	19684	13.35	6.62	1.48	-22.7	46	
1720	10.00	150	10.98	19628	13.35	6.85	1.48	-24.1	46	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] QED BLADDER [ ] SIMCO BLADDER [X] PERISTALTIC
TYPE OF TUBING: [ ] TEFLON OR TEFLON LINED [X] HIGH DENSITY POLYETHYLENE [ ] LDPE (Dedicated)
TYPE OF PUMP MATERIAL: [ ] POLYVINYL CHLORIDE [ ] STAINLESS STEEL [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 1.68

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Michael A. Lowe
Sampler Signature:

LOCATION SKETCH See S.P. MAP

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: MP-1#1
COMPREHENSIVE ROUND
SAMPLE ID: OL-MP-1#1-4444
SITE TYPE: Superfund
DATE: 5/24/16
TIME START: 1048 END: 1145
JOB NUMBER: 6107190016
BOTTLE TIME: 1130

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 2.5 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 2.0 FT.

INITIAL DEPTH TO WATER: NM FT.
WELL DEPTH (TOR): 39 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 1/4 IN.

FINAL DEPTH TO WATER: NM FT.
SCREEN LENGTH: — FT.
PID WELL MOUTH: N/A PPM
WELL INTEGRITY: CAP YES; CASING YES; LOCKED COLLAR YES

DRAWDOWN VOLUME: — GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: —
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 1.0 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1052	Begin	Purge								
1058	NM	150	12.95	87034	3.81	8.34	1.25	174.3	32.5	
1100	NM	150	13.11	87705	3.77	3.15	1.70	175.8		
1105	NM	150	13.17	87732	3.76	2.04	0.51	176.1		
1110	NM	150	13.10	87617	3.76	1.63	0.37	175.8		
1115	NM	150	13.04	87670	3.71	1.54	0.26	173.3		
1120	NM	150	13.01	87623	3.71	1.47	0.18	170.1		
1125	NM	150	13.01	87580	3.71	1.45	0.15	168.6	0	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 1.0

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Maxwell Lowe
Sampler Signature:

LOCATION SKETCH

~~Well Mat~~
See Site Map

Purge water green / Effervescent
Strong odor

Checked by: CTM Multi-Port Well Tree #1

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: MP-1#4
COMPREHENSIVE ROUND
SAMPLE ID: OC-MP-1#4
SITE TYPE: Superfund
DATE: 5/29/15
TIME: START 917 END 1030
JOB NUMBER: 6107190016
BOTTLE TIME: 1020

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO
MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING [ ] OTHER
PROTECTIVE CASING STICKUP (FROM GROUND): 123.5 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 20.5 FT.
INITIAL DEPTH TO WATER: nm FT.
WELL DEPTH (TOR): 39 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 1/4 IN.
FINAL DEPTH TO WATER: nm FT.
SCREEN LENGTH: — FT.
PID WELL MOUTH: N/A PPM
WELL INTEGRITY: CAP YES; CASING YES; LOCKED COLLAR YES
DRAWDOWN VOLUME: — GAL.
(final - initial x 0.16 (2-inch) or x 0.65 (4-inch))
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: —
PRESSURE TO PUMP: N/A PSI
TOTAL VOL. PURGED: 1.4 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
921	Begin	Dry								
925	nm	150	12.50	6599	4.06	4.89	9.73	154.5	30'	
930	nm	150	12.60	6662	3.91	11.62	3.30	119.6		
935	nm	150	12.67	6623	3.86	6.44	0.82	111.1		
940	nm	150	12.71	6582	3.85	3.88	0.46	106.3		
945	nm	150	12.78	6544	3.83	2.81	0.35	102.4		
950	nm	150	12.76	6507	3.82	2.15	0.39	98.7		
955	nm	150	12.85	6493	3.83	1.75	0.57	95.4		
1000	nm	150	12.91	6470	3.83	1.48	0.27	94.9		
1005	nm	150	12.92	6441	3.82	1.26	0.21	94.1		
1010	nm	150	12.85	6421	3.81	1.20	0.19	91.3		
1015	nm	150	12.86	6407	3.81	1.15	0.54	89.3	↓	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP: [ ] QED BLADDER [ ] SIMCO BLADDER [X] PERISTALTIC
TYPE OF TUBING: [ ] TEFLON OR TEFLON LINED [X] HIGH DENSITY POLYETHYLENE [ ] LDPE (Dedicated)
TYPE OF PUMP MATERIAL: [ ] POLYVINYL CHLORIDE [ ] STAINLESS STEEL [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 1.4

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Daniel H. Lounsbury
Sampler Signature:

LOCATION SKETCH

See site map

microwell #1 Zone #4 - Water level not measured

& fluorescent

Checked by: DM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	MP-1 #14	COMPREHENSIVE ROUND	
SAMPLE ID	OC-MP-1#14-XXX	SITE TYPE	Superfund	DATE	5/29/19
TIME	START 800 END 913	JOB NUMBER	6107190016	BOTTLE TIME	905

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO

MEASUREMENT POINT: [X] TOP OF WELL RISER; [ ] TOP OF PROTECTIVE CASING; [ ] OTHER ______

PROTECTIVE CASING STICKUP (FROM GROUND): ^ 3.5 FT.

PROTECTIVE CASING / WELL DIFFERENCE: <to.5 FT.

INITIAL DEPTH TO WATER: N/A FT.

WELL DEPTH (TOR): 39 FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: 1/4 IN.

FINAL DEPTH TO WATER: N/A FT.

SCREEN LENGTH: — FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY: YES / NO / N/A — CAP: YES; CASING: YES; LOCKED: NO; COLLAR: N/A

DRAWDOWN VOLUME: N/A GAL. (final - initial x 0.16 {2-inch} or x 0.65 {4-inch})

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: —

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 1.0 GAL. (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
824	Begin Purge									
831	NM	150	12.42	1112	7.00	3.13	11.8	26.5	14'	
836	NM	150	12.16	904	6.70	2.63	2.57	52.8		
841	NM	150	12.21	854	6.73	2.20	6.89	64.6		
846	NM	150	12.16	838	6.71	3.04	1.89	69.1		
851	NM	150	12.10	826	6.70	2.38	5.69	73.0		
856	NM	150	12.07	817	6.70	2.29	5.47	73.2		
901	NM	150	12.06	813	6.70	2.34	2.29	81.5		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL
[ ] QED BLADDER	[ ] TEFLON OR TEFLON LINED	[ ] POLYVINYL CHLORIDE
[ ] SIMCO BLADDER	[X] HIGH DENSITY POLYETHYLENE	[ ] STAINLESS STEEL
[X] PERISTALTIC	[ ] LDPE (Dedicated)	[X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: YES (circled) NO

NUMBER OF GALLONS GENERATED: 1.0

LOCATION SKETCH See Site Map

1/4 tubing (microwell) no water level taken.

Effervescent

Multi-Port Well Zone 14

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Michelle Lowther

Sampler Signature: [signature]

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-10DR
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-10DR-XXX
SITE TYPE: Superfund
DATE: 5/29/19
TIME START: 1300 END: 1430
JOB NUMBER: 6107190016
BOTTLE TIME: 1420

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 2.4 FT.
PROTECTIVE CASING / WELL DIFFERENCE: -0.2 FT.

INITIAL DEPTH TO WATER: 5.84 FT.
WELL DEPTH (TOR): 26.8 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2 IN.

FINAL DEPTH TO WATER: 5.86 FT.
SCREEN LENGTH: 10 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	✓		
CASING	✓		
LOCKED	✓		
COLLAR	✓		

DRAWDOWN VOLUME: <0.01 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 1.2 GAL.
<0.01
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1326	Begin Purge									
1336	5.86	250	10.74	1075	5.83	2.55	70.3	-33.2	24	
1341	5.86	150	10.35	665	6.07	1.22	9.88	-20.6	24	
1346	5.86	150	10.41	531	6.17	1.35	7.23	-18.9	24	
1351	5.86	150	10.40	479	6.22	1.53	5.96	-18.0	24	
1356	5.86	150	10.35	381	6.24	1.63	6.11	-16.0	24	
1401	5.86	150	10.24	377	6.25	1.66	3.29	-18.8	24	
1406	5.86	150	10.23	383	6.28	1.61	2.70	-36.4	24	
1411	5.86	150	10.20	370	6.28	1.54	2.05	-36.5	24	
1416	5.86	150	10.20	364	6.28	1.50	1.73	-35.8	24	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 1.2

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Michelle Lemon
Sampler Signature:

LOCATION SKETCH

See Site Map

Strong odor

Purge water is colored Yellow

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-15
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-15-XXX
SITE TYPE: Superfund
DATE: 5/28/2019
TIME START: 1420 END: 1620
JOB NUMBER: 6107190016
BOTTLE TIME: 15:57

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: /

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): 1.85 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 0.39 FT.

INITIAL DEPTH TO WATER: 8.01 FT.
WELL DEPTH (TOR): ~~18.5~~ FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 3" IN.

FINAL DEPTH TO WATER: 10.50 FT.
SCREEN LENGTH: ~~10~~ 5 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

DRAWDOWN VOLUME (final - initial x 0.16 {2-inch} or x 0.65 {4-inch}): ~~1.61~~ 0.91 GAL. (OK)
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 3.5 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
0.26
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. mS/cm (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1430	/	/	/	/	/	/	/	/	/	BEGIN PURGE
1435	8.87	125	10.73	0.063	5.66	1.18	48.4	126.4	~16'	
1440	9.45	125	10.73	0.062	5.65	0.97	88.5	134.4		ORANGE FLOC
1445	9.96	125	10.75	0.060	5.60	1.01	51.3	141.4		
1450	10.07	125	10.73	0.060	5.50	0.92	44.9	144.2		
1455	10.24	125	10.72	0.060	5.59	0.97	37.7	147.3		
1500	10.32	125	10.71	0.060	5.62	1.07	53.1	152.6		
1505	10.49	125	10.52	0.061	5.64	1.71	22.8	151.2		
1510	10.56	125	10.58	0.062	5.63	2.40	23.2	144.9		
1515	10.51	100	10.54	0.061	5.63	2.49	32.9	143.8		
1520	10.50	100	10.50	0.061	5.62	2.32	27.3	144.0		
1525	10.44	100	10.46	0.061	5.87	1.96	38.3	135.6		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated) - NEW 05/28/2019 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 3.5gal

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

LOCATION SKETCH

Sampled by: I ANDESJARLIS
Sampler Signature:

Checked by: CJM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-15
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-15-XXX
SITE TYPE: Superfund
DATE: 05/28/2019
TIME: START 1420 END 1620
JOB NUMBER: 6107190016
BOTTLE TIME: 15:57

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: ✓

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 1.85 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 0.39 FT.

INITIAL DEPTH TO WATER: 8.01 FT.
WELL DEPTH (TOR): 18.5 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 3" IN.

FINAL DEPTH TO WATER: 10.50 FT.
SCREEN LENGTH: 5 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

DRAWDOWN VOLUME: 0.91 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 3.5 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
0.26
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
CONT'D FROM	PG 1 of 2									
1530	10.50	100	10.57	0.076	5.87	2.03	35.2	133.5		
1535	10.50	100	10.52	0.074	5.86	2.12	39.1	127.4		
1540	10.50	100	10.51	0.075	5.85	2.12	41.4	125.2		
1545	10.50	100	10.52	0.076	5.84	2.04	46.0	123.5		
1550	10.50	100	10.51	0.076	5.87	2.01	49.0	120.4		
1555	10.50	100	10.59	0.080	5.93	2.06	47.0	119.0		
1557									~16	COLLECT SAMPLE

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated) NEW 05/28/2019 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 3.5 gal

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

LOCATION SKETCH

Sampled by: IAN DESJARLAIS
Sampler Signature:

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-16R
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-16R-XXX
SITE TYPE: Superfund
DATE: 5/28/2019
TIME: START 12:40 END 1410
JOB NUMBER: 6107190016
BOTTLE TIME: 13:47

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: —

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 2.75 FT.
PROTECTIVE CASING / WELL DIFFERENCE: -0.27 FT.

INITIAL DEPTH TO WATER: 10.79 FT.
WELL DEPTH (TOR): 17.2 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2" IN.

FINAL DEPTH TO WATER: 10.95 FT.
SCREEN LENGTH: 5 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

DRAWDOWN VOLUME: 0.03 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 2.25 GAL.
0.013
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1250	/	200	/	/	/	/	/	/	~15'	BEGIN PURGE
1300	10.98	150	11.53	0.286	6.26	1.70	84.0	42.5	|	EMPTY FLOWTHRU CELL
1307	10.91	150	11.56	0.188	6.40	4.05	51.9	22.5	|	DUE TO TURBIDITY
1315	10.93	150	11.51	0.189	6.39	1.56	17.0	22.2	|	|
1320	10.94	150	11.39	0.189	6.40	1.18	12.0	24.2	|	|
1325	10.94	150	11.53	0.188	6.40	0.89	6.51	27.1	|	|
1330	10.95	150	11.60	0.186	6.39	0.92	4.54	27.3	|	|
1335	10.95	150	11.64	0.186	6.40	0.86	4.53	28.1	|	|
1340	10.95	150	11.60	0.186	6.39	0.81	3.54	27.9	|	|
1345	10.95	150	11.60	0.186	6.40	0.87	3.02	28.0	X	|
1347	/	/	/	/	/	/	/	/	/	COLLECT SAMPLE
/	/	/	/	/	/	/	/	/	/	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated) — NEW 05/28/19 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 2.25

LOCATION SKETCH

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: IAN DESJARLAIS
Sampler Signature:

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-325
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-325-XXX
SITE TYPE: Superfund
DATE: 5/28/19
TIME START: 1513 END: 1600
JOB NUMBER: 6107190016
BOTTLE TIME: 1555

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 1.7 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 0.32 FT.

INITIAL DEPTH TO WATER: 8.46 FT.
WELL DEPTH (TOR): 15 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2 IN.

FINAL DEPTH TO WATER: 8.59 FT.
SCREEN LENGTH: 10 FT.
PID WELL MOUTH: N/A PPM
WELL INTEGRITY: CAP — YES: — NO: X N/A: —; CASING LOCKED COLLAR — YES: X NO: — N/A: —

DRAWDOWN VOLUME: 0.02 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: 1.13 gal. / 0.02
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: ~~0.40~~ GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1520	Begin	Purg	17.7							
1524	8.61	175	10.71	48	5.81	7.80	25.1	10.0	13'	
1529	8.59	150	10.65	40	5.27	4.56	1.41	24.7	13	
1534	8.59	150	10.61	36	5.03	4.53	2.98	20.2	13	
1539	8.59	150	10.65	35	4.98	4.20	1.59	16.9	13	
1544	8.59	150	10.62	34	4.88	4.20	1.28	16.2	13	
1549	8.59	150	10.64	33	4.83	4.13	1.30	14.2	13	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: NA ~~1.0~~ 0.84 1.13

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Michael H. Lowe
Sampler Signature:

LOCATION SKETCH

See Site map
Stainless Steel well

Checked by: cm

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-32D
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-32D-XXX
SITE TYPE: Superfund
DATE: 5/23/24
TIME START: 1415 END: 1511
JOB NUMBER: 6107190016
BOTTLE TIME: 1505

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: NO
MEASUREMENT POINT: [X] TOP OF WELL RISER [ ] TOP OF PROTECTIVE CASING [ ] OTHER
PROTECTIVE CASING STICKUP (FROM GROUND): 1.5 FT.
PROTECTIVE CASING / WELL DIFFERENCE: -0.03 FT.
INITIAL DEPTH TO WATER: 8.62 FT.
WELL DEPTH (TOR): 31 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2 IN.
FINAL DEPTH TO WATER: 8.62 FT.
SCREEN LENGTH: 10 FT.
PID WELL MOUTH: N/A PPM
WELL INTEGRITY: CAP YES; CASING YES; LOCKED COLLAR NO
DRAWDOWN VOLUME: - GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI
TOTAL VOL. PURGED: 1.52 GAL. <0.01
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1424	Bell	Pump		Turbine						
1428	8.62	150	11.21	0.266	6.77	2.12	3.95	8.9	28'	
1433	8.62	150	11.21	0.266	6.80	1.67	4.17	-11.5	28	
1438	8.62	150	11.22	0.264	6.82	1.17	3.74	-25.1	28	
1443	8.62	150	11.23	0.263	6.82	1.00	3.36	-34.1	28	
1448	8.62	150	11.23	0.261	6.82	0.97	3.55	-38.5	28	
1453	8.62	150	11.23	0.259	6.81	0.89	4.03	-42.7	28	
1458	8.62	150	11.21	259	6.81	0.96	4.27	-44.1	28	
1503	8.62	150	11.17	256	6.80	0.95	4.66	-45.9	28	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
[ ] QED BLADDER
[ ] SIMCO BLADDER
[X] PERISTALTIC

TYPE OF TUBING
[ ] TEFLON OR TEFLON LINED
[X] HIGH DENSITY POLYETHYLENE
[ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
[ ] POLYVINYL CHLORIDE
[ ] STAINLESS STEEL
[X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED [YES] NO
NUMBER OF GALLONS GENERATED: 1.5 gal

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Maxwell Lovett
Sampler Signature:

LOCATION SKETCH

See Site map
stainless Steel well

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-54D
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-54D-YYY
SITE TYPE: Superfund
DATE: 5/28/19
TIME START: 1230 END: 1400
JOB NUMBER: 6107190016
BOTTLE TIME: 1336

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: MS / MSD / Dup
INITIAL DEPTH TO WATER: 4.60 FT.
FINAL DEPTH TO WATER: 4.67 FT.
DRAWDOWN VOLUME: 0.01 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
TOTAL VOL. PURGED: 1.44 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

WELL DEPTH (TOR): 20 FT.
SCREEN LENGTH: 10 FT.
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: < 0.01

PROTECTIVE CASING STICKUP (FROM GROUND): 2.7 FT.
PID AMBIENT AIR: N/A PPM
PID WELL MOUTH: N/A PPM
PRESSURE TO PUMP: N/A PSI
REFILL TIMER SETTING: N/A SEC.

PROTECTIVE CASING / WELL DIFFERENCE: -0.21 FT.
WELL DIAMETER: 2 IN.

WELL INTEGRITY:

	YES	NO	N/A
CAP	✓		
CASING	✓		
LOCKED	✓		
COLLAR	✓		

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. mS/cm (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1243	Before Purge									
1252	4.67	200	11.84	0.366	6.13	2.23	7.31	-31.4	18	
1257	4.67	200	11.50	0.157	6.05	0.99	5.60	-3.0	18	
1302	4.67	200	10.93	0.090	5.76	1.54	5.52	15.2	18	
1307	4.67	200	10.77	0.080	5.75	1.58	4.62	24.7	18	
1312	4.67	200	10.65	0.082	5.81	1.84	2.21	34.7	18	
1317	4.67	200	10.67	0.080	5.85	1.80	3.21	41.0	18	
1322	4.67	200	10.56	0.078	5.86	1.76	2.73	46	18	
1327	4.67	200	10.54	0.077	5.87	1.82	2.89	48.1	18	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated)

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 1.5

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: Maxwell Lowe
Sampler Signature:

LOCATION SKETCH

See Site Map

OC-GW-54D-Dup - Duplicate
OC-GW-54D-MS - Matrix Spike
OC-GW-54D-MSD - Matrix Dup.

Checked by:

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-101
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-101-XXX
SITE TYPE: Superfund
DATE: 5/28/2019
TIME: START 1645 END 1825
JOB NUMBER: 6107190016
BOTTLE TIME: 1813

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID:

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): 2.69 FT.
PROTECTIVE CASING / WELL DIFFERENCE: 0.28 FT.

INITIAL DEPTH TO WATER: 11.36 FT.
WELL DEPTH (TOR): 18.71 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2.0 IN.

FINAL DEPTH TO WATER: 11.44 FT.
SCREEN LENGTH: 11.5 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

DRAWDOWN VOLUME: 0.01 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 4.0 GAL.
0.003
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1710	11.41	250	10.78	0.540	6.19	0.91	8.39	53.3	~15'	
1720	11.43	250	10.85	0.503	6.18	0.78	5.84	50.6	"	
1730	11.44	250	10.85	0.476	6.17	0.75	8.47	46.2		
1735	11.44	250	10.92	0.444	6.16	0.79	6.89	41.7		
1740	11.44	250	10.88	0.434	6.15	1.01	6.66	38.2		
1745	11.44	250	10.87	0.430	6.13	1.44	4.35	35.1		
1750	11.44	250	10.90	0.418	6.14	1.54	5.20	32.3		
1755	11.44	250	10.93	0.409	6.14	1.30	3.65	28.8		
1800	11.44	250	10.96	0.398	6.13	1.17	2.10	24.9		
1805	11.44	250	10.99	0.388	6.12	1.06	1.69	23.0		
1810	11.44	250	10.99	0.385	6.12	1.04	1.62	22.8		
1813	11.44	250	11.00	0.384	6.10	1.00	1.48	21.7	↓	

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated)

NEW 05/28/2019 PEAK QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[X] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[X] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 4.0

LOCATION SKETCH

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: IAN DESJARDINS
Sampler Signature:

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-305
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-305-XXX
SITE TYPE: Superfund
DATE: 5/29/2019
TIME: START 0750 END 1055
JOB NUMBER: 6107190016
BOTTLE TIME: 10:14

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: /

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): FLUSH FT.
PROTECTIVE CASING / WELL DIFFERENCE: -0.28 FT.

INITIAL DEPTH TO WATER: 5.94 FT.
WELL DEPTH (TOR): 18.0 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2 IN.

FINAL DEPTH TO WATER: 5.98 FT.
SCREEN LENGTH: 10 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:	YES	NO	N/A
CAP	X		
CASING			X
LOCKED			X
COLLAR	X		

DRAWDOWN VOLUME: 0.04 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 8.5 GAL.
0.004
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
0810										BEGIN PURGE - HEAVY
										OXIDIZED ORANGE
										COLLOID SUSPENSION
↓										PURGE ~2.5 GALLONS
0835										PURGE CLEARS - TUNNEL IT
0840										CELL
0845	5.98	200	11.38	0.184	6.25	0.65	368	9.6	16	
0850	5.98	200	11.43	0.181	6.31	0.65	722	-9.5		
0855	5.98	200	11.43	0.179	6.30	0.76	>1000	-10.5		NTU OUT OF RANGE
0900	5.98	200	11.47	0.176	6.28	1.24	578	-20.1		
0905	5.98	200	11.38	0.168	6.28	2.02	346	-23.9		
0910	5.98	200	11.44	0.165	6.31	1.83	244	-30.6		

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated) NEW - 05/29/2019 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 8.5

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

LOCATION SKETCH

Sampled by: IAN DESJARLAIS
Sampler Signature:

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT: OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA
WELL ID: GW-305
COMPREHENSIVE ROUND
SAMPLE ID: OC-GW-305-XXX
SITE TYPE: Superfund
DATE: 05/29/2019
TIME: START 0750 END 1055
JOB NUMBER: 6107190016
BOTTLE TIME: 10:14

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: /

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER

PROTECTIVE CASING STICKUP (FROM GROUND): FLUSH FT.
PROTECTIVE CASING / WELL DIFFERENCE: -0.28 FT.

INITIAL DEPTH TO WATER: 5.94 FT.
WELL DEPTH (TOR): 18.0 FT.
PID AMBIENT AIR: N/A PPM
WELL DIAMETER: 2 IN.

FINAL DEPTH TO WATER: 5.98 FT.
SCREEN LENGTH: 10 FT.
PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	X		
CASING			X
LOCKED			X
COLLAR	X		

DRAWDOWN VOLUME: 0.04 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})
RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED
PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 8.5 GAL. — 0.004
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)
REFILL TIMER SETTING: N/A SEC.
DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
0915	5.98	200	11.46	0.162	6.31	1.48	124	-23.7	16	NEW CARBOY (5 GALLONS)
0920	5.98	200	11.48	0.161	6.30	1.30	116	-22.2		
0925	5.98	200	11.44	0.159	6.30	1.15	95.5	-27.3		
0930	5.98	200	11.47	0.158	6.29	1.06	67.2	-34.4		
0935	5.98	200	11.51	0.158	6.29	0.97	44.4	-35.2		
0940	5.98	200	11.49	0.157	6.29	0.95	43.1	-41.0		
0945	5.98	200	11.49	0.157	6.30	0.93	46.4	-46.4		
0950	5.98	200	11.52	0.156	6.30	0.87	44.2	-47.6		
0955	5.98	200	11.58	0.156	6.31	0.84	40.3	-47.6		
10:00	5.98	200	11.52	0.157	6.31	0.83	41.1	-27.5		-MAJOR Δ ORP?
10:05	5.98	200	11.53	0.156	6.31	0.78	44.2	-24.7		
10:10	5.98	200	11.53	0.157	6.32	0.75	45.8	-26.2	↓	SAMPLE @ 10:14

EQUIPMENT DOCUMENTATION

TYPE OF PUMP
- [ ] QED BLADDER
- [ ] SIMCO BLADDER
- [X] PERISTALTIC

TYPE OF TUBING
- [ ] TEFLON OR TEFLON LINED
- [X] HIGH DENSITY POLYETHYLENE
- [ ] LDPE (Dedicated)

TYPE OF PUMP MATERIAL
- [ ] POLYVINYL CHLORIDE
- [ ] STAINLESS STEEL
- [X] SILICON (Dedicated) NEW 05/29/2019 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED: [YES] NO
NUMBER OF GALLONS GENERATED: 8.5

NOTES

* = If 3 turbidity readings are < 5 NTU, then parameter is stable

If Turbidity is > 25 NTU then collect a filtered metals sample

LOCATION SKETCH

Sampled by: IAN DESJARLAIS
Sampler Signature:

Checked by: CTM

wood.

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

PROJECT	OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID	GW-307	COMPREHENSIVE ROUND	
SAMPLE ID	OC-GW-307-XXX	SITE TYPE	Superfund	DATE	5/29/2019
TIME	START 1240 END 1325	JOB NUMBER	6107190016	BOTTLE TIME	13:18

WATER LEVEL / PUMP SETTINGS

QC SAMPLE COLLECTED ID: /

MEASUREMENT POINT
- [X] TOP OF WELL RISER
- [ ] TOP OF PROTECTIVE CASING
- [ ] OTHER _____

PROTECTIVE CASING STICKUP (FROM GROUND): 2.18 FT.

PROTECTIVE CASING / WELL DIFFERENCE: -0.11 FT.

INITIAL DEPTH TO WATER: 6.03 FT.

WELL DEPTH (TOR): 19.45 FT.

PID AMBIENT AIR: N/A PPM

WELL DIAMETER: 2 IN.

FINAL DEPTH TO WATER: 8.07 FT.

SCREEN LENGTH: 10 FT.

PID WELL MOUTH: N/A PPM

WELL INTEGRITY:

	YES	NO	N/A
CAP	X		
CASING	X		
LOCKED	X		
COLLAR	X		

DRAWDOWN VOLUME: 0.326 GAL.
(final - initial x 0.16 {2-inch} or x 0.65 {4-inch})

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED: 0.10

PRESSURE TO PUMP: N/A PSI

TOTAL VOL. PURGED: 3.0 GAL.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)

REFILL TIMER SETTING: N/A SEC.

DISCHARGE TIMER SETTING: N/A SEC.

PURGE DATA

TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
1220	7.75	175	9.27	0.392	6.76	2.94	18.6	-76.1	~17	BEGIN PURGE
1230	8.07	175	8.99	0.387	6.99	1.34	13.7	-102.9		/
1235	8.13	125	9.03	0.387	7.08	1.13	18.8	-112.7		
1240	8.12	125	9.06	0.397	7.13	1.09	31.8	-102.1		NTU CHANGE
1245	8.14	125	9.04	0.419	7.15	0.97	34.9	-78.8		
1250	8.20	125	8.97	0.428	7.16	0.93	37.2	-107.2		/
1255	8.14	100	9.05	0.433	7.13	0.93	31.4	-110.6		SLOWER RATE
1300	8.09	100	9.06	0.454	7.16	1.16	28.3	-85.8		
1305	8.07	100	9.05	0.462	7.18	1.67	26.2	-82.9		/
1310	8.07	100	9.08	0.462	7.19	1.55	23.0	-91.9		/
1315	8.07	100	9.04	0.463	7.19	1.42	24.1	-97.3		/
1318	/	/	/	/	/	/	/	/	X	SAMPLE

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL
[ ] QED BLADDER	[ ] TEFLON OR TEFLON LINED	[ ] POLYVINYL CHLORIDE
[ ] SIMCO BLADDER	[X] HIGH DENSITY POLYETHYLENE	[ ] STAINLESS STEEL
[X] PERISTALTIC	[ ] LDPE (Dedicated)	[X] SILICON (Dedicated) NEW 05/29/2019 PER QAPP

ANALYTICAL PARAMETERS

To Be Collected	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED
[ ] VOCs	8260C	HCL / 4 DEG. C	3 X 40 mL VOC vial	[ ] VOCs
[ ] Hydrazine, MMH, UDMH	Mod 8315 LC/MS/MS	Acetate Buffer	2 X 40 mL VOC vial	[ ] Hydrazine, MMH, UDMH
[ ] NDMA	Modified - EPA 521	4 DEG. C - no sunlight	2 X 1L Amber Glass	[ ] NDMA
[ ] Formaldehyde	SW-846 8315A	4 DEG. C	2 X 250mL Amber Glass	[ ] Formaldehyde
[ ] Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] METALS
[ ] Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As)	6010C/6020A	Nitric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] DISSOLVED METALS
[ ] Hexavalent Chromium (Cr+6)	7199	4 DEG. C - no headspace	1 X 250 mL Poly	[ ] Hexavalent Chromium (Cr+6)
[ ] Ammonia	EPA 350.1	Sulfuric Acid / 4 DEG. C	1 X 250 mL Poly	[ ] Ammonia
[ ] Anions (Chloride & Sulfate)	300.0	4 DEG. C	1 X 125 mL Poly	[ ] Anions (Chloride & Sulfate)
[ ] Specific Gravity	SM2710F	4 DEG. C	1 X 500 mL Poly	[ ] Specific Gravity
[X] PFAS	Modified - EPA 537	< 6 DEG. C	2 X 250 mL HDPE	[X] PFAS

PURGE OBSERVATIONS

PURGE WATER CONTAINERIZED [YES] NO

NUMBER OF GALLONS GENERATED ~3.0

NOTES

*** = If 3 turbidity readings are < 5 NTU, then parameter is stable**

If Turbidity is > 25 NTU then collect a filtered metals sample

Sampled by: J. IBANDES/J. ARIAS

Sampler Signature:

LOCATION SKETCH

Checked by: CTM

wood.

ATTACHMENT B
DATA VALIDATION REPORT

FINAL
DATA VALIDATION REPORT
REMEDIAL INVESTIGATION

OPERABLE UNIT 3
PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)
GROUNDWATER SAMPLING EVENT

OLIN CHEMICAL SUPERFUND SITE
51 EAMES STREET
WILMINGTON, MASSACHUSETTS

Prepared for:

Olin Corporation
3855 North Ocoee Street; Suite 200
Cleveland, Tennessee 37312

Prepared by:

Wood Environment & Infrastructure Solutions, Inc.
271 Mill Road
Chelmsford, Massachusetts 01824

September 27, 2019

Project No. 6107190016.001.10

FINAL
DATA VALIDATION REPORT
REMEDIAL INVESTIGATION

OPERABLE UNIT 3

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Chelmsford, Massachusetts 01824

September 27, 2019

Project No. 6107190016.001.10

Elizabeth Bowen
Project Manager

Mike Murphy
Principal Scientist

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LIST OF ACRONYMS AND ABBREVIATIONS

%D	% Difference
HT	Holding Time
IS-L	Internal Standard response below limit
J	estimated value
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MassDEP	Massachusetts Department of Environmental Protection
mls	milliliters
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MS-H	Matrix Spike recovery high
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutanesulfonic acid
PFDoA	Perfluorododecanoic acid
PFHpA	Perfluoroheptanoic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFTeDA	Perfluorotetradecanoic acid
QAPP	Quality Assurance Project Plan
SDG	Sample Delivery Group
U	Non-detect
UJ	Reporting Limit Qualified as Estimated
USEPA	United States Environmental Protection Agency
Wood	Wood Environment & Infrastructure Solutions, Inc.

1.0 INTRODUCTION

Groundwater samples were collected by Wood Environment & Infrastructure Solutions, Inc. (Wood) at the Olin Chemical Superfund Site in May 2019. The sampling and analysis approach for this groundwater event was based on specifications detailed in the Addendum I Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation/Feasibility Study Work Plan Project Operations Plan Volume III-B Quality Assurance Project Plan (Wood, 2019a) and Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan (Massachusetts Department of Environmental Protection [MassDEP], 2018). Samples were analyzed using the following analytical method:

Laboratory	Parameter	Analytical Method	Validation Level
Eurofins – Lancaster, PA	PFAS	United States Environmental Protection Agency (USEPA) Method 537 Version 1.1 Modified (PFAS by LC-MS-MS)	10% Stage 4/ 90% Stage 2A

The PFAS groundwater samples were collected from May 28 and May 29, 2019. Sample OC-MP-1#1-XXX was re-extracted and reanalyzed because the initial laboratory analysis was done at a high dilution and PFAS was not detected. The sample was reanalyzed at a lower dilution to obtain detection limits that were closer to achieving project data quality objectives. A summary of samples included in this data validation report is presented in **Table 1**. Analytical data packages were reviewed in accordance with the Olin Chemical Superfund Site Final Remedial Investigation/Feasibility Study Work Plan Quality Assurance Project Plan (QAPP) [Wood, 2019b] and specification in the QAPP Addendum I [Wood, 2019a]. Sample data were validated using staged data validation (USEPA, 2009) identified in Region 1 EPA-New England Environmental Data Review Program Guidance (USEPA, 2018), the general procedures identified in USEPA National Functional Guidelines (USEPA, 2017) and the judgment of the validator as applicable to the modified Method 537 procedure and method performance criteria were developed for this project as indicated in the QAPP Addendum I.

Final validated sample results are presented in **Table 2**. Documentation of data validation actions is presented in **Table 3. Table 3** is a summary of laboratory results that have been qualified (data validation has resulted in revisions to the laboratory result). An index of the qualification reason codes is presented in **Table 3**.

2.0 PFAS

Samples were analyzed for 14 PFAS compounds identified in the QAPP Addendum I. The following items were reviewed during validation:

* Data Completeness
  Holding Times (HT) and Preservation
* Blanks
* Instrument Tunes
* Initial Calibration Standards
* Continuing Calibration Standards
* Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)
  Matrix Spikes (MS)/Matrix Spike Duplicates (MSD)
* Field Duplicates
  Surrogate Recovery/Internal Standards
  Detection Limits
* Target Compound Identification
* Sample Result Verification/Electronic Database Verification
* Raw data verification and calculation checks

* = indicates that criteria were met for this parameter

Except for the validation actions noted below, sample results are interpreted to be usable as reported by the laboratory. A summary of final results is presented in **Table 2**. A summary of data validation actions is presented in **Table 3**.

2.1 Holding Times and Preservation

Sample Delivery Group (SDG) TAO20 / Group 2052690

A reduced volume (2.5 milliliters [mls]) of sample OC-MP-1#1-XXX was extracted by the lab due to matrix interferences which resulted in an effective 100X dilution of the sample. PFAS compounds were reported as not detected with elevated reporting limits in this initial analysis. Due to this excessive dilution, the Olin Corporation requested sample OC-MP-1#1-XXX be re-extracted and analyzed. The sample was re-extracted at 10 mls which resulted in an effective 25X dilution of the sample. This re-extraction was performed eight days past the 14 day extraction hold time specified in the method. PFAS compounds were reported as not detected in the second analysis that was extracted outside of hold time. Results from the second analysis were reported in the final data set with elevated reporting limits that were qualified estimated (UJ).

A summary of holding time qualification actions is presented in **Table 3** with results being assigned a validation qualifier reason code of HT for sample holding times.

2.2 MS/MSD

SDG TAO18 / Group 2046067

The MS and/or MSD associated with sample OC-GW-54D-XXX and its field duplicate OC-GW-54D-DUP had percent recoveries above the upper quality control limits for perfluorohexanoic acid (PFHxA)(144%/ 135%), perfluoroheptanoic acid (PFHpA) (141%/144%), perfluorohexanesulfonic acid (PFHxS) (MSD 139%), perfluorononanoic acid (PFNA) (142%/144%), perfluorododecanoic acid (PFDoA) (139%/140%), and perfluorotetradecanoic acid (PFTeDA) (MS 145%).

Detections of PFHxA, PFHpA and PFNA in samples OC-GW-54D-XXX and OC-GW-54D-DUP were qualified as estimated (J) due to the potential high bias. PFHxS, PFDoA and PFTeDA were nondetect in the associated samples and not impacted by the potential high bias and no qualifications were necessary. A summary of MS/MSD qualification actions is presented in **Table 3** for PFAS with results being assigned a validation qualifier reason code of MS-H.

2.3 Internal Standards

SDG TAO18 / Group 2046067

The percent difference (%D) between the internal standard I13C3-PFBA in sample OC-MP-1#4-XXX and the initial calibration was outside of the control limit of 50 at -53 %D. The result for perfluorobutanesulfonic acid (PFBS) in sample OC-MP-1#4-XXX was qualified as estimated (J) and assigned a reason code of IS-L in **Table 3**.

2.4 Detection Limits

SDG TAO20 / Group 2052690

Sample OC-MP-1#1-XXX was analyzed at dilution due to matrix interferences (see discussion in Section 2.1 above). Compounds reported as not detected in diluted sample have elevated detection limits. Sample quantitation limits for the sample are presented in **Table 2.**

2.5 Data Usability

Except for the validation actions noted above, sample results are interpreted to be usable as reported by the laboratory. There were no results rejected during the validation review of the data contained in this report. Of the 196 results reported, 21 results (11%) were qualified as estimated due to hold time exceedances, low internal standard response, and/or high matrix spike recoveries. PFAS compounds were not detected in the laboratory blanks and the laboratory control spikes were with in QC limits specified in the QAPP, indicating good precision and accuracy for the data set.

3.0 REFERENCES

MassDEP, 2018. Fact Sheet Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan; June 19.

USEPA, 2009. "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use"; Office of Solid Waste and Emergency Response; EPA-540-R-08-005; January 2009.

USEPA, 2017. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review"; Office of Superfund Remediation and Technology Innovation; EPA-540-/R-2017-002; January 2017.

USEPA, 2018. "Region I EPA-New England Environmental Data Review Program Guidance"; Office of Environmental Measurement and Evaluation (OEME); June 2018.

Wood, 2019a. "Addendum I Per- and Polyfluoroalkyl Substances (PFAS) Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; May, 2019.

Wood, 2019b. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; May, 2019.

Data validation was completed by:

Elizabeth Penta

TABLES

Table 1 - Sample Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

						Lab ID	Lancast
						Analysis Method	EPA 537.1 MOD
						Fraction	N
Lab Sample Delivery Group	**Laboratory Group Number**	**Location**	**Field Sample ID**	**Media**	**Sample Date**	**QC Code**	**Param_Count**
TAO18	2046391	GW-10DR	OC-GW-10DR-XXX	GW	5/29/2019	FS	14
TAO18	2046391	GW-305	OC-GW-305-XXX	GW	5/29/2019	FS	14
TAO18	2046391	GW-307	OC-GW-307-XXX	GW	5/29/2019	FS	14
TAO20	2052690	MP-1 #01	OC-MP-1#1-XXX	GW	5/29/2019	FS	14
TAO18	2046391	MP-1 #04	OC-MP-1#4-XXX	GW	5/29/2019	FS	14
TAO18	2046391	MP-1 #14	OC-MP-1#14-XXX	GW	5/29/2019	FS	14
TAO18	2046067	BR-1	OC-BR-1-XXX	GW	5/28/2019	FS	14
TAO18	2046067	QC	OC-FB-052819	BW	5/28/2019	FB	14
TAO18	2046067	GW-101	OC-GW-101-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-15	OC-GW-15-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-16R	OC-GW-16R-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-32D	OC-GW-32D-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-32S	OC-GW-32S-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-54D	OC-GW-54D-DUP	GW	5/28/2019	FD	14
TAO18	2046067	GW-54D	OC-GW-54D-XXX	GW	5/28/2019	FS	14

Notes:
Lancast= Eurofins Lancaster Laboratories Environmental, LLC.
BW = Blank water
FB = Field Blank
FD = Field Duplicate
FS = Field Sample
GW = Groundwater
Fraction = N- Normal

Created by: KMS 7/25/19
Checked by: EAP 8/14/19

Table 2
Final Results Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

			Location	2046067		2046067		2046067		2046067		2046067	
			Lab Sample Delivery Group	BR-1		GW-101		GW-15		GW-16R		GW-32D	
			Field Sample Date	5/28/2019		5/28/2019		5/28/2019		5/28/2019		5/28/2019	
			Field Sample ID	OC-BR-1-XXX		OC-GW-101-XXX		OC-GW-15-XXX		OC-GW-16R-XXX		OC-GW-32D-XXX	
			QC Code	FS		FS		FS		FS		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7	U	2.5	U	2.7	U	2.6	U	1.8	J
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7	U	2.5	U	2.7	U	2.6	U	2.7	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.78	J	0.76	J	0.99		0.83	J	0.87	J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8	U	1.7	U	1.8	U	1.7	U	1.8	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8	U	1.7	U	1.8	U	1.7	U	1.8	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	2.1		2.3		0.52	J	0.89		1.4	
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	1.1	J	1.7	U	0.44	J	1.7	U	0.65	J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	3.4		5.3		0.68	J	1.6	J	1.8	J
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.1	J	1.3	J	1.8	U	0.55	J	0.97	J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	6.4		5.1		3.5		2		8.1	
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	8.4		5.2		2.5		3.2		5	
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.91	U	0.84	U	0.9	U	0.86	U	0.9	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.91	U	0.84	U	0.9	U	0.86	U	0.9	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8	U	1.7	U	1.8	U	1.7	U	1.8	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 2
Final Results Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

			Location	2046067		2046067		2046067		2046067	
			Lab Sample Delivery Group	GW-32S		GW-54D		GW-54D		QC	
			Field Sample Date	5/28/2019		5/28/2019		5/28/2019		5/28/2019	
			Field Sample ID	OC-GW-32S-XXX		OC-GW-54D-DUP		OC-GW-54D-XXX		OC-FB-052819	
			QC Code	FS		FD		FS		FB	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7	U	2.7	U	2.7	U	2.6	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7	U	2.7	U	2.7	U	2.6	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.91	U	0.49	J	0.54	J	0.87	U
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	0.45	J	1.1	J	1.1	J	0.87	U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	1.8	U	1.8	U	1.8	U	1.7	U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	1.8	U	1.8	J	1.7	J	1.7	U
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.8	U	1	J	1.1	J	1.7	U
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	0.51	J	1.5	J	1.6	J	1.7	U
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	1.7		2.2		2.4		0.87	U
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.91	U	0.89	U	0.89	U	0.87	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.91	U	0.89	U	0.89	U	0.87	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8	U	1.8	U	1.8	U	1.7	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 2
Final Results Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

			Location	2046391		2046391		2046391		2046391	
			Lab Sample Delivery Group	GW-10DR		GW-305		GW-307		MP-1 #04	
			Field Sample Date	5/29/2019		5/29/2019		5/29/2019		5/29/2019	
			Field Sample ID	OC-GW-10DR-XXX		OC-GW-305-XXX		OC-GW-307-XXX		OC-MP-1#4-XXX	
			QC Code	FS		FS		FS		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7	U	2.6	U	2.7	U	2.7	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7	U	2.6	U	2.7	U	2.7	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.7	J	0.55	J	1.2		0.42	J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8	U	1.7	U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8	U	1.7	U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	1.8		1.3		1.9		0.9	U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	0.38	J	1.7	U	1.8	U	0.61	J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	1.7	J	1.2	J	2.5		2.4	
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1	J	0.69	J	1.1	J	0.82	J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	1.6	J	1.7	J	2.8		4.8	
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	6.4		2.9		5.4		11	
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.89	U	0.86	U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.89	U	0.86	U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8	U	1.7	U	1.8	U	1.8	U

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Table 2
Final Results Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

			Location	2046391		2052690	
			Lab Sample Delivery Group	MP-1 #14		MP-1 #01	
			Field Sample Date	5/29/2019		5/29/2019	
			Field Sample ID	OC-MP-1#14-XXX		OC-MP-1#1-XXX	
			QC Code	FS		FS	
Method	**Fraction**	**Parameter**	**Units**	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7	U	75	UJ
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7	U	75	UJ
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.82	J	25	UJ
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8	U	50	UJ
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8	U	50	UJ
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	1.5		25	UJ
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	0.47	J	50	UJ
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	2		50	UJ
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.2	J	50	UJ
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	2.8		50	UJ
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	5.1		25	UJ
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.9	U	25	UJ
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.9	U	25	UJ
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8	U	50	UJ

Notes:
FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Created by: KMS 8/15/19
Checked by: EAP 8/15/19

Table 3
Data Validation Action Summary
Data Validation Report
May 2019 PFAS Groundwater Sampling Event
Olin Chemical Superfund Site
Wilmington, Massachusetts

Lab Sample Delivery Group	Analysis Method	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units	Lab ID
2046067	EPA 537.1 MOD	1067736	OC-GW-54D-DUP	Perfluoroheptanoic acid (PFHpA)	1.1		1.1	J	MS-H	ng/l	Lancast
2046067	EPA 537.1 MOD	1067736	OC-GW-54D-DUP	Perfluorohexanoic acid (PFHxA)	1.8	J	1.8	J	MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067736	OC-GW-54D-DUP	Perfluorononanoic acid (PFNA)	1	J	1	J	MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737	OC-GW-54D-XXX	Perfluoroheptanoic acid (PFHpA)	1.1		1.1	J	MS-H	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737	OC-GW-54D-XXX	Perfluorohexanoic acid (PFHxA)	1.7	J	1.7	J	MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737	OC-GW-54D-XXX	Perfluorononanoic acid (PFNA)	1.1	J	1.1	J	MS-H, Q	ng/l	Lancast
2046391	EPA 537.1 MOD	1069025	OC-MP-1#4-XXX	Perfluorobutanesulfonic acid (PFBS)	0.42	J	0.42	J	IS-L, Q	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	75	U	75	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	75	U	75	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorobutanesulfonic acid (PFBS)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorodecanoic acid (PFDA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorododecanoic acid (PFDoA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluoroheptanoic acid (PFHpA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorohexanesulfonic acid (PFHxS)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorohexanoic acid (PFHxA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorononanoic acid (PFNA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorooctanessulfonic acid (PFOS)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorooctanoic acid (PFOA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorotetradecanoic acid (PFTeDA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorotridecanoic acid (PFTrDA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluoroundecanoic acid (PFUnDA)	50	U	50	UJ	HT	ng/l	Lancast

Units:
ng/l = nanograms per liter

Validation Qualifiers:
U = Not detected, value is the reporting limit
J = Value is estimated

Validation Reason Codes:
HT = Holding time for prep or analysis exceeded
IS-L = Internal standard response below limit
MS-H = MS and/or MSD recovery high
Q = Constituent was detected between the MDL and RL

Prepared by / Date: KMS 8/15/19
Checked by / Date: EAP 8/15/19

ATTACHMENT C
LABORATORY ANALYTICAL REPORT

eurofins | Lancaster Laboratories Environmental

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

TestAmerica
501 Southampton Road
Suite C
Westfield MA 01085

Report Date: June 07, 2019 15:28

Project: Olin Wilmington

Account #: 01042
Group Number: 2046067
SDG: TAO18
PO Number: 48006612
Release Number: REWI0025
State of Sample Origin: MA

Electronic Copy To	Olin Chemicals	Attn: James Cashwell
Electronic Copy To	Olin Corporation	Attn: Chinny Esakkiperumal
Electronic Copy To	Wood PLC	Attn: Binks Colby-George
Electronic Copy To	Wood PLC	Attn: Tige Cunningham
Electronic Copy To	Wood PLC	Attn: Chris Ricardi
Electronic Copy To	Wood PLC	Attn: Karen Savage
Electronic Copy To	Wood PLC	Attn: Peter Thompson
Electronic Copy To	Wood PLC	Attn: Chris Mazzolini
Electronic Copy To	Wood	Attn: Elizabeth Penta

Respectfully Submitted,

Lynn M. Frederiksen
Principal Specialist Group Leader

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
OC-FB-052819 Water	05/28/2019 13:15	1067731
OC-GW-15-XXX Groundwater	05/28/2019 15:57	1067732
OC-GW-16R-XXX Groundwater	05/28/2019 13:47	1067733
OC-GW-32D-XXX Groundwater	05/28/2019 15:05	1067734
OC-GW-32S-XXX Groundwater	05/28/2019 15:55	1067735
OC-GW-54D-DUP Groundwater	05/28/2019 13:30	1067736
OC-GW-54D-XXX Groundwater	05/28/2019 13:30	1067737
OC-GW-54D-MS Groundwater	05/28/2019 13:30	1067738
OC-GW-54D-MSD Groundwater	05/28/2019 13:30	1067739
OC-BR-1-XXX Groundwater	05/28/2019 17:30	1067740
OC-GW-101-XXX Groundwater	05/28/2019 18:13	1067741

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Project: Olin Wilmington
This form provides certifications for the following data set: 1067731-1067741

Sample Matrices: Water

Methods Used:
EPA 537 Version 1.1 Modified

Affirmative responses to questions A through F are required for "Presumptive Certainty" status		Yes or No[1]
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes
E	**VPH, EPH, APH, and TO-15 only:** a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	NA NA
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes
Responses to Questions G, H and I below are required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	Yes
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.		
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	No
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes
[1] Refer to the Case Narrative for information regarding negative responses.		
I, the undersigned, attest under the pains and penalties of perjury that the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.		

Christiane S. Sweigart
Senior Specialist

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Project Name: Olin Wilmington
ELLE Group #: 2046067

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Batch #: 19151009 (Sample number(s): 1067731-1067741 UNSPK: 1067737)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: Perfluorononanoic acid, Perfluorododecanoic acid, Perfluorohexanoic acid, Perfluoroheptanoic acid, Perfluorohexanesulfonic acid, Perfluorotetradecanoic acid

The recovery(ies) for one or more surrogates exceeded the acceptance window indicating a positive bias for sample(s) 1067739, MSD

Sample Description: **OC-FB-052819 Water**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:15
SDG#: TAO18-01FB

TestAmerica
ELLE Sample #: **GW 1067731**
ELLE Group #: **2046067**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.6	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.6	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	N.D.	0.87	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid[1]	375-85-9	N.D.	0.87	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid[1]	307-24-4	N.D.	1.7	1
14473	Perfluorononanoic acid[1]	375-95-1	N.D.	1.7	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	N.D.	1.7	1
14473	Perfluorooctanoic acid[1]	335-67-1	N.D.	0.87	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.87	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.87	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.7	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 00:23	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-15-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 15:57
SDG#: TAO18-02

TestAmerica
ELLE Sample #: GW 1067732
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.99	0.90	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	0.52 J	0.90	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	0.44 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	0.68 J	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	N.D.	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	3.5	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	2.5	0.90	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 00:33	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-16R-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:47
SDG#: TAO18-03

TestAmerica
ELLE Sample #: GW 1067733
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.6	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.6	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.83 J	0.86	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid[1]	375-85-9	0.89	0.86	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.6 J	1.7	1
14473	Perfluorononanoic acid[1]	375-95-1	0.55 J	1.7	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	2.0	1.7	1
14473	Perfluorooctanoic acid[1]	335-67-1	3.2	0.86	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.86	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.86	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.7	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 00:42	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-32D-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 15:05
SDG#: TAO18-04

TestAmerica
ELLE Sample #: GW 1067734
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	1.8 J	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.87 J	0.90	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.4	0.90	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	0.65 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.8 J	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	0.97 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	8.1	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	5.0	0.90	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:00	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-32S-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 15:55
SDG#: TAO18-05

TestAmerica
ELLE Sample #: GW 1067735
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	N.D.	0.91	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	0.45 J	0.91	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	N.D.	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	N.D.	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	0.51 J	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	1.7	0.91	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.91	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.91	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:09	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-54D-DUP Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-06FD

TestAmerica
ELLE Sample #: GW 1067736
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.49 J	0.89	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.1	0.89	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.8 J	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.0 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	1.5 J	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	2.2	0.89	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:18	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-54D-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07BKG

TestAmerica
ELLE Sample #: GW 1067737
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.54 J	0.89	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.1	0.89	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.7 J	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.1 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	1.6 J	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	2.4	0.89	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:27	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-54D-MS Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07MS

TestAmerica
ELLE Sample #: GW 1067738
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	6.1	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	5.5	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	6.2	0.89	1
14473	Perfluorodecanoic acid[1]	335-76-2	5.9	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	6.7	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	8.0	0.89	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	5.9	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	8.7	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	7.9	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	6.6	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	9.1	0.89	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	7.0	0.89	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	6.5	0.89	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	6.6	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:36	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-54D-MSD Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07MSD

TestAmerica
ELLE Sample #: GW 1067739
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	6.1	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	6.6	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	6.1	0.90	1
14473	Perfluorodecanoic acid[1]	335-76-2	6.8	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	6.9	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	8.2	0.90	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	6.4	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	8.3	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	8.1	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	6.6	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	9.3	0.90	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	6.5	0.90	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	6.8	0.90	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	6.3	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:45	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-BR-1-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 17:30
SDG#: TAO18-08

TestAmerica
ELLE Sample #: GW 1067740
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.78 J	0.91	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	2.1	0.91	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	1.1 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	3.4	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.1 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	6.4	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	8.4	0.91	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.91	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.91	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:54	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

Sample Description: **OC-GW-101-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 18:13
SDG#: TAO18-09

TestAmerica
ELLE Sample #: GW 1067741
ELLE Group #: 2046067
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.5	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.5	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.76 J	0.84	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid[1]	375-85-9	2.3	0.84	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid[1]	307-24-4	5.3	1.7	1
14473	Perfluorononanoic acid[1]	375-95-1	1.3 J	1.7	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	5.1	1.7	1
14473	Perfluorooctanoic acid[1]	335-67-1	5.2	0.84	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.84	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.84	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.7	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 02:03	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

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Quality Control Summary

Client Name: TestAmerica
Reported: 06/07/2019 15:28

Group Number: 2046067

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ
	ng/l	ng/l
Batch number: 19151009	Sample number(s): 1067731-1067741	
NEtFOSAA	N.D.	3.0
NMeFOSAA	N.D.	3.0
Perfluorobutanesulfonic acid	N.D.	1.0
Perfluorodecanoic acid	N.D.	2.0
Perfluorododecanoic acid	N.D.	2.0
Perfluoroheptanoic acid	N.D.	1.0
Perfluorohexanesulfonic acid	N.D.	2.0
Perfluorohexanoic acid	N.D.	2.0
Perfluorononanoic acid	N.D.	2.0
Perfluorooctanesulfonic acid	N.D.	2.0
Perfluorooctanoic acid	N.D.	1.0
Perfluorotetradecanoic acid	N.D.	1.0
Perfluorotridecanoic acid	N.D.	1.0
Perfluoroundecanoic acid	N.D.	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19151009	Sample number(s): 1067731-1067741								
NEtFOSAA	5.44	5.32			98		55-169		
NMeFOSAA	5.44	5.21			96		44-147		
Perfluorobutanesulfonic acid	4.81	4.75			99		73-128		
Perfluorodecanoic acid	5.44	5.09			94		69-148		
Perfluorododecanoic acid	5.44	5.50			101		75-136		
Perfluoroheptanoic acid	5.44	5.89			108		76-140		
Perfluorohexanesulfonic acid	5.14	4.95			96		71-131		
Perfluorohexanoic acid	5.44	6.07			112		75-135		
Perfluorononanoic acid	5.44	5.54			102		72-148		
Perfluorooctanesulfonic acid	5.20	4.76			92		67-138		
Perfluorooctanoic acid	5.44	5.53			102		72-138		
Perfluorotetradecanoic acid	5.44	4.79			88		74-135		
Perfluorotridecanoic acid	5.44	5.70			105		61-145		
Perfluoroundecanoic acid	5.44	5.38			99		75-146		

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: TestAmerica
Reported: 06/07/2019 15:28

Group Number: 2046067

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19151009	Sample number(s): 1067731-1067741 UNSPK: 1067737									
NEtFOSAA	N.D.	4.85	6.13	4.89	6.15	127	126	49-159	0	30
NMeFOSAA	N.D.	4.85	5.46	4.89	6.57	113	134	58-157	19	30
Perfluorobutanesulfonic acid	0.536	4.29	6.23	4.33	6.09	133	128	73-134	2	30
Perfluorodecanoic acid	N.D.	4.85	5.88	4.89	6.76	121	138	73-142	14	30
Perfluorododecanoic acid	N.D.	4.85	6.74	4.89	6.87	139*	140*	76-136	2	30
Perfluoroheptanoic acid	1.11	4.85	7.96	4.89	8.17	141*	144*	67-137	3	30
Perfluorohexanesulfonic acid	N.D.	4.58	5.93	4.63	6.43	129	139*	73-129	8	30
Perfluorohexanoic acid	1.74	4.85	8.74	4.89	8.34	144*	135*	70-130	5	30
Perfluorononanoic acid	1.08	4.85	7.95	4.89	8.11	142*	144*	70-130	2	30
Perfluorooctanesulfonic acid	1.56	4.63	6.63	4.68	6.63	109	108	48-154	0	30
Perfluorooctanoic acid	2.43	4.85	9.06	4.89	9.33	137	141	48-160	3	30
Perfluorotetradecanoic acid	N.D.	4.85	7.04	4.89	6.50	145*	133	78-133	8	30
Perfluorotridecanoic acid	N.D.	4.85	6.52	4.89	6.77	135	138	57-151	4	30
Perfluoroundecanoic acid	N.D.	4.85	6.55	4.89	6.32	135	129	66-137	4	30

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS
Batch number: 19151009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
1067731	89	87	87	87	91	90
1067732	111	72	84	75	79	81
1067733	107	88	102	93	84	80
1067734	108	89	100	91	94	88
1067735	105	89	93	89	88	90
1067736	102	84	101	84	85	86
1067737	110	94	106	88	87	91
1067738	100	93	102	84	88	85
1067739	108	94	105	87	90	94
1067740	103	84	87	75	88	95
1067741	98	82	91	80	80	79
Blank	82	81	82	86	85	82
LCS	82	88	85	87	87	88
MS	100	93	102	84	88	85

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: TestAmerica
Reported: 06/07/2019 15:28

Group Number: 2046067

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS
Batch number: 19151009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
MSD	108	94	105	87	90	94
Limits:	26-148	35-138	34-126	35-126	48-122	50-121

	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1067731	90	94	106	95	102	91
1067732	79	84	97	94	94	87
1067733	74	87	101	103	97	104
1067734	87	81	93	93	103	96
1067735	88	90	95	87	84	83
1067736	78	85	117	111	112	106
1067737	84	91	124	117	121	111
1067738	83	96	108	110	108	106
1067739	81	89	111	125	127	108
1067740	90	91	94	91	104	88
1067741	68	77	95	104	98	104
Blank	82	85	90	89	89	80
LCS	92	89	88	85	88	78
MS	83	96	108	110	108	106
MSD	81	89	111	125	127	108
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA
1067731	93
1067732	78
1067733	114
1067734	93
1067735	88
1067736	102
1067737	112
1067738	106
1067739	120*
1067740	97
1067741	107
Blank	86
LCS	90
MS	106
MSD	120*
Limits:	26-119

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Quality Control Summary

Client Name: TestAmerica
Group Number: 2046067
Reported: 06/07/2019 15:28

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

A 01042 | 6 2046067 | S1067731-741

wood.

Wood Environment and Infrastructure, Inc.
511 Congress Street
Portland, ME 04101
(207) 775-5401

SHIP TO:
Lancaster Lab
2425 New Holland Pike
Lancaster, PA 17601
Atten: Lynn Frederiksen
Lab Phone# (717) 656-2300

CHAIN OF CUSTODY

DATE: 5/28/2019
COC #: Olin190528A
PAGE: 1 OF 1

Project Name:	Olin Wilmington	Project Contact:	Tige Cunningham or Chris Mazzolini	Bill To: **TestAmerica**	Disposal Instructions: LAB
Project Number:	**6107190016**	Phone Number:	Tige = (207) 329-0164 Chris = (339) 927-3796		Shipment Method: FEDEX
Project Manager:	Libby Bowen	Project Phase:	001.07	Release Order must be noted on all invoices	Waybill Number: N/A

Sample Information						Methods for Analysis	RUSH		
No.	Sample ID	Date & Time Sampled	Matrix	Sample Type	MS/MSD	PFAS (537) Lancaster (2) 250mL HDPE	STD (2-Week)	TOTAL BOTTLES	HOLD All Analyses
1	OC-FB-052819	05/28/19 13:15	FB	FB	N	X	X	2	
2	OC-GW-15-XXX	05/28/19 15:57	GW	N	N	X	X	2	
3	OC-GW-16R-XXX	05/28/19 13:47	GW	N	N	X	X	2	
4	OC-GW-32D-XXX	05/28/19 15:05	GW	N	N	X	X	2	
5	OC-GW-32S-XXX	05/28/19 15:55	GW	N	N	X	X	2	
6	OC-GW-54D-DUP	05/28/19 13:30	GW	FD	N	X	X	2	
7	OC-GW-54D-MS	05/28/19 13:30	GW	MS	Y	X	X	2	
8	OC-GW-54D-MSD	05/28/19 13:30	GW	MSD	Y	X	X	2	
9	OC-GW-54D-XXX	05/28/19 13:30	GW	N	N	X	X	2	
10	OC-BR-1-XXX	05/28/19 17:30	GW	N	N	X	X	2	
11	OC-GW-101-XXX	05/28/19 18:13	GW	N	N	X	X	2	
12									

Sampler's Signature: elizabeth penta	Elizabeth Penta	**Date:** 5/28/2019	**Time:** 18:30
Relinquished By/Affiliation: elizabeth penta	wood	**Date:** 5/28/2019	**Time:** 18:30
Received By: FedEx		**Date:** 5/28/2019	**Time:** 18:45
Relinquished By/Affiliation:		**Date:**	**Time:**
Received By:		**Date:**	**Time:**
Relinquished By/Affiliation:		**Date:**	**Time:**
Received By (LAB):		**Date:** 5/29/19	**Time:** 1020

For Lab Use

Does COC match samples:	Y or N
Broken Container:	Y or (N)
COC seal intact:	(Y) or N
Other problems:	Y or (N)
WSDOT contacted:	Y or N
Date contacted:	
Cooler Temperature at receipt:	4.9 °C

Comments:
X=Analyze H=Hold Analysis Request

Please See PO# REWI0025 for Invoicing
TAL Project # = 48006612

NUMBER OF COOLERS SENT:

Deliverables: Level 2, Level 4 and EQUIS EZ EDD

eurofins | Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 250135

Group Number(s): 2046067

Client: Wood Env.

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	05/29/2019 10:20
Number of Packages:	1	Number of Projects:	1

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Nicole Reiff (25684) at 13:39 on 05/29/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	4.9	DT	Wet	Y	Bagged	N

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Lancaster, PA 17605-2425
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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

TestAmerica
501 Southampton Road
Suite C
Westfield MA 01085

Report Date: June 12, 2019 11:59

Project: Olin Wilmington

Account #: 01042
Group Number: 2046391
SDG: TAO18
PO Number: 48006612
State of Sample Origin: MA

Electronic Copy To	Olin Chemicals	Attn: James Cashwell
Electronic Copy To	Olin Corporation	Attn: Chinny Esakkiperumal
Electronic Copy To	Wood PLC	Attn: Binks Colby-George
Electronic Copy To	Wood PLC	Attn: Tige Cunningham
Electronic Copy To	Wood PLC	Attn: Chris Ricardi
Electronic Copy To	Wood PLC	Attn: Karen Savage
Electronic Copy To	Wood PLC	Attn: Peter Thompson
Electronic Copy To	Wood PLC	Attn: Chris Mazzolini
Electronic Copy To	Wood	Attn: Elizabeth Penta
Electronic Copy To	Wood PLC	Attn: Libby Bowen

Respectfully Submitted,

Lynn M. Frederiksen
Principal Specialist Group Leader

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
OC-GW-10DR-XXX Groundwater	05/29/2019 14:20	1069020
OC-GW-305-XXX Groundwater	05/29/2019 10:14	1069021
OC-GW-307-XXX Groundwater	05/29/2019 13:18	1069022
OC-MP-1#14-XXX Groundwater	05/29/2019 09:05	1069023
OC-MP-1#1-XXX Groundwater	05/29/2019 11:30	1069024
OC-MP-1#4-XXX Groundwater	05/29/2019 10:20	1069025

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Project: Olin Wilmington
This form provides certifications for the following data set: 1069020-1069025

Sample Matrices: Water

Methods Used:
EPA 537 Version 1.1 Modified

Affirmative responses to questions A through F are required for "Presumptive Certainty" status		Yes or No[1]
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes
E	**VPH, EPH, APH, and TO-15 only:** a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	 NA NA
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes
Responses to Questions G, H and I below are required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	No
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.		
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	Yes
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes
[1] Refer to the Case Narrative for information regarding negative responses.		
I, the undersigned, attest under the pains and penalties of perjury that the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.		

Kenneth Boley
Senior Specialist, Quality Assurance

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Project Name: Olin Wilmington
ELLE Group #: 2046391

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Sample #s: 1069024

Reporting limits were raised due to interference from the sample matrix.

Sample #s: 1069025

The sample injection internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

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Sample Description: **OC-GW-10DR-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 14:20
SDG#: TAO18-10

TestAmerica
ELLE Sample #: GW 1069020
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.70 J	0.89	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.8	0.89	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	0.38 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.7 J	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.0 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	1.6 J	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	6.4	0.89	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:01	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

Sample Description: **OC-GW-305-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 10:14
SDG#: TAO18-11

TestAmerica
ELLE Sample #: GW 1069021
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.6	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.6	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.55 J	0.86	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.3	0.86	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid[1]	307-24-4	1.2 J	1.7	1
14473	Perfluorononanoic acid[1]	375-95-1	0.69 J	1.7	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	1.7 J	1.7	1
14473	Perfluorooctanoic acid[1]	335-67-1	2.9	0.86	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.86	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.86	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.7	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:10	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

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Sample Description: **OC-GW-307-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 13:18
SDG#: TAO18-12

TestAmerica
ELLE Sample #: GW 1069022
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**		**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.		2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.					
14473	NMeFOSAA[1]	2355-31-9	N.D.		2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.					
14473	Perfluorobutanesulfonic acid[1]	375-73-5	1.2		0.88	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.		1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.		1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.9		0.88	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.		1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	2.5		1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.1	J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	2.8		1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	5.4		0.88	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.		0.88	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.		0.88	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.		1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:19	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

Sample Description: **OC-MP-1#14-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 09:05
SDG#: TAO18-13

TestAmerica
ELLE Sample #: GW 1069023
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.82 J	0.90	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	1.5	0.90	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	0.47 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	2.0	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	1.2 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	2.8	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	5.1	0.90	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:28	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

Sample Description: **OC-MP-1#1-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 11:30
SDG#: TAO18-14

TestAmerica
ELLE Sample #: GW 1069024
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	300	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	300	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	N.D.	99	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	200	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	200	1
14473	Perfluoroheptanoic acid[1]	375-85-9	N.D.	99	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	200	1
14473	Perfluorohexanoic acid[1]	307-24-4	N.D.	200	1
14473	Perfluorononanoic acid[1]	375-95-1	N.D.	200	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	N.D.	200	1
14473	Perfluorooctanoic acid[1]	335-67-1	N.D.	99	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	99	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	99	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	200	1

Reporting limits were raised due to interference from the sample matrix.

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:37	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

Sample Description: **OC-MP-1#4-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 10:20
SDG#: TAO18-15

TestAmerica
ELLE Sample #: GW 1069025
ELLE Group #: 2046391
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	2.7	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	2.7	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	0.42 J	0.90	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid[1]	375-85-9	N.D.	0.90	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	0.61 J	1.8	1
14473	Perfluorohexanoic acid[1]	307-24-4	2.4	1.8	1
14473	Perfluorononanoic acid[1]	375-95-1	0.82 J	1.8	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	4.8	1.8	1
14473	Perfluorooctanoic acid[1]	335-67-1	11	0.90	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	1.8	1

The sample injection internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:46	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

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Quality Control Summary

Client Name: TestAmerica
Reported: 06/12/2019 11:59

Group Number: 2046391

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ
	ng/l	ng/l
Batch number: 19156008	Sample number(s): 1069020-1069025	
NEtFOSAA	N.D.	3.0
NMeFOSAA	N.D.	3.0
Perfluorobutanesulfonic acid	N.D.	1.0
Perfluorodecanoic acid	N.D.	2.0
Perfluorododecanoic acid	N.D.	2.0
Perfluoroheptanoic acid	N.D.	1.0
Perfluorohexanesulfonic acid	N.D.	2.0
Perfluorohexanoic acid	N.D.	2.0
Perfluorononanoic acid	N.D.	2.0
Perfluorooctanesulfonic acid	N.D.	2.0
Perfluorooctanoic acid	N.D.	1.0
Perfluorotetradecanoic acid	N.D.	1.0
Perfluorotridecanoic acid	N.D.	1.0
Perfluoroundecanoic acid	N.D.	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19156008	Sample number(s): 1069020-1069025								
NEtFOSAA	5.44	5.59	5.44	5.17	103	95	55-169	8	30
NMeFOSAA	5.44	5.96	5.44	6.02	110	111	44-147	1	30
Perfluorobutanesulfonic acid	4.81	4.82	4.81	5.08	100	106	73-128	5	30
Perfluorodecanoic acid	5.44	6.16	5.44	5.77	113	106	69-148	6	30
Perfluorododecanoic acid	5.44	5.91	5.44	5.85	109	108	75-136	1	30
Perfluoroheptanoic acid	5.44	6.32	5.44	6.82	116	125	76-140	8	30
Perfluorohexanesulfonic acid	5.14	5.78	5.14	5.77	112	112	71-131	0	30
Perfluorohexanoic acid	5.44	6.48	5.44	6.38	119	117	75-135	1	30
Perfluorononanoic acid	5.44	6.37	5.44	6.37	117	117	72-148	0	30
Perfluorooctanesulfonic acid	5.20	4.81	5.20	5.14	93	99	67-138	7	30
Perfluorooctanoic acid	5.44	6.11	5.44	6.05	112	111	72-138	1	30
Perfluorotetradecanoic acid	5.44	5.44	5.44	6.29	100	116	74-135	15	30
Perfluorotridecanoic acid	5.44	5.85	5.44	5.92	108	109	61-145	1	30
Perfluoroundecanoic acid	5.44	5.98	5.44	5.68	110	104	75-146	5	30

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: TestAmerica
Reported: 06/12/2019 11:59

Group Number: 2046391

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS
Batch number: 19156008

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
1069020	118	80	97	84	90	82
1069021	124	89	103	91	86	98
1069022	133	80	91	77	84	77
1069023	134	79	90	74	84	85
1069024	85	78	80	81	85	81
1069025	131	70	95	79	85	82
Blank	99	100	97	98	101	99
LCS	102	104	96	101	103	104
LCSD	99	94	91	95	93	91
Limits:	26-148	35-138	34-126	35-126	48-122	50-121

	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1069020	80	89	107	101	104	87
1069021	92	84	90	74	61	84
1069022	75	80	93	81	83	71
1069023	74	89	98	89	87	95
1069024	77	87	85	93	76	86
1069025	74	82	86	85	81	86
Blank	98	102	111	102	118	103
LCS	101	94	117	101	113	105
LCSD	98	99	113	109	124	98
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA
1069020	56
1069021	85
1069022	39
1069023	95
1069024	85
1069025	81
Blank	97
LCS	112
LCSD	93
Limits:	26-119

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

1042 | 2046391 | 1069020-25

wood.

Wood Environment and Infrastructure, Inc.
511 Congress Street
Portland, ME 04101
(207) 775-5401

SHIP TO:
Lancaster Lab
2425 New Holland Pike
Lancaster, PA 17601
Atten: Lynn Frederiksen
Lab Phone# (717) 656-2300

CHAIN OF CUSTODY

DATE: 5/29/2019
COC #: Olin190529A
PAGE: 1 OF 1

Project Name:	Olin Wilmington	Project Contact:	Tige Cunningham or Chris Mazzolini	Bill To: **TestAmerica**	Disposal Instructions: LAB
Project Number:	6107190016	Phone Number:	Tige = (207) 329-0164 Chris = (339) 927-3796		Shipment Method: FEDEX
Project Manager:	Libby Bowen	Project Phase:	.001.07	Release Order must be noted on all invoices	Waybill Number: N/A

Sample Information / **Methods for Analysis** / **RUSH**

No.	Sample ID	Date & Time Sampled	Matrix	Sample Type	MS/MSD	PFAS (537) Lancaster (2) 250mL HDPE	STD (2-Week)	TOTAL BOTTLES	HOLD All Analyses
1	OC-GW-10DR-XXX	05/29/19 14:20	GW	N	N	X	X	2	
2	OC-GW-305-XXX	05/29/19 10:14	GW	N	N	X	X	2	
3	OC-GW-307-XXX	05/29/19 13:18	GW	N	N	X	X	2	
4	OC-MP-1 #14-XXX	05/29/19 09:05	GW	N	N	X	X	2	
5	OC-MP-1 #1-XXX	05/29/19 11:30	GW	N	N	X	X	2	
6	OC-MP-1 #4XXX	05/29/19 10:20	GW	N	N	X	X	2	
7									
8									
9									
10									
11									
12									

Sampler's Signature: elizabeth penta	Elizabeth Penta	**Date:** 05/29/2019	**Time:** 16:00
Relinquished By/Affiliation: elizabeth penta	wood	**Date:** 05/29/2019	**Time:** 16:00
Received By: FedEx		**Date:** 05/29/2019	**Time:** 16:30
Relinquished By/Affiliation:		**Date:**	**Time:**
Received By:		**Date:**	**Time:**
Relinquished By/Affiliation:		**Date:**	**Time:**
Received By (LAB):		**Date:** 5/30/19	**Time:** 1020

For Lab Use

Does COC match samples:	(Y) or N
Broken Container:	Y or (N)
COC seal intact:	(Y) or N
Other problems:	Y or (N)
WSDOT contacted:	Y or N
Date contacted:	
Cooler Temperature at receipt:	3.3 °C

Comments:
X=Analyze H=Hold Analysis Request

Please See PO# REWI0025 for invoicing
TAL Project # = 48006612

NUMBER OF COOLERS SENT: 1

Deliverables: Level 2, Level 4 and EQUIS EZ EDD

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Sample Administration Receipt Documentation Log

Doc Log ID: 250260

Group Number(s): 2046391

Client: Wood Environmental and Infrastructure

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	05/30/2019 10:20
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	ME		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Simon Nies (25112) at 15:57 on 05/30/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-03	3.3	DT	Wet	Y	Bagged	N

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Lancaster, PA 17605-2425
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F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

TestAmerica
501 Southampton Road
Suite C
Westfield MA 01085

Report Date: July 19, 2019 12:46

Project: Olin Wilmington

Account #: 01042
Group Number: 2052690
SDG: TAO20
PO Number: 48006612
State of Sample Origin: MA

Electronic Copy To	Olin Chemicals	Attn: James Cashwell
Electronic Copy To	Olin Corporation	Attn: Chinny Esakkiperumal
Electronic Copy To	Wood PLC	Attn: Binks Colby-George
Electronic Copy To	Wood PLC	Attn: Tige Cunningham
Electronic Copy To	Wood PLC	Attn: Chris Ricardi
Electronic Copy To	Wood PLC	Attn: Karen Savage
Electronic Copy To	Wood PLC	Attn: Peter Thompson
Electronic Copy To	Wood PLC	Attn: Chris Mazzolini
Electronic Copy To	Wood	Attn: Elizabeth Penta
Electronic Copy To	Wood PLC	Attn: Libby Bowen

Respectfully Submitted,

Lynn M. Frederiksen
Principal Specialist Group Leader

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.

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SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
OC-MP-1#1-XXX Groundwater	05/29/2019 11:30	1097483

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Eurofins Lancaster Laboratories Environmental
Project: Olin Wilmington
This form provides certifications for the following data set: Sample number(s): 1097483

Sample Matrices: Water

Methods Used:
EPA 537 Version 1.1 Modified

Affirmative responses to questions A through F are required for "Presumptive Certainty" status		Yes or No[1]
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes
E	**VPH, EPH, APH, and TO-15 only:** a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	 NA NA
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes
Responses to Questions G, H and I below are required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	No
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.		
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	Yes
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes

[1] Refer to the Case Narrative for information regarding negative responses.

I, the undersigned, attest under the pains and penalties of perjury that the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Kenneth Boley
Senior Specialist, Quality Assurance

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Project Name: Olin Wilmington
ELLE Group #: 2052690

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Sample #s: 1097483

Reporting limits were raised due to interference from the sample matrix.

The holding time was not met. Per client request, this sample was extracted outside of the method holding time.

Sample Description: **OC-MP-1#1-XXX Groundwater**
Olin Wilmington

Project Name: **Olin Wilmington**

Submittal Date/Time: 05/30/2019 10:20
Collection Date/Time: 05/29/2019 11:30
SDG#: TAO20-01

TestAmerica
ELLE Sample #: GW 1097483
ELLE Group #: 2052690
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/MS Miscellaneous	**EPA 537 Version 1.1 Modified**		**ng/l**	**ng/l**	
14473	NEtFOSAA[1]	2991-50-6	N.D.	75	1
	NEtFOSAA is the acronym for N-ethyl perfluorooctanesulfonamidoacetic Acid.				
14473	NMeFOSAA[1]	2355-31-9	N.D.	75	1
	NMeFOSAA is the acronym for N-methyl perfluorooctanesulfonamidoacetic Acid.				
14473	Perfluorobutanesulfonic acid[1]	375-73-5	N.D.	25	1
14473	Perfluorodecanoic acid[1]	335-76-2	N.D.	50	1
14473	Perfluorododecanoic acid[1]	307-55-1	N.D.	50	1
14473	Perfluoroheptanoic acid[1]	375-85-9	N.D.	25	1
14473	Perfluorohexanesulfonic acid[1]	355-46-4	N.D.	50	1
14473	Perfluorohexanoic acid[1]	307-24-4	N.D.	50	1
14473	Perfluorononanoic acid[1]	375-95-1	N.D.	50	1
14473	Perfluorooctanesulfonic acid[1]	1763-23-1	N.D.	50	1
14473	Perfluorooctanoic acid[1]	335-67-1	N.D.	25	1
14473	Perfluorotetradecanoic acid[1]	376-06-7	N.D.	25	1
14473	Perfluorotridecanoic acid[1]	72629-94-8	N.D.	25	1
14473	Perfluoroundecanoic acid[1]	2058-94-8	N.D.	50	1

Reporting limits were raised due to interference from the sample matrix.

The holding time was not met. Per client request, this sample was extracted outside of the method holding time.

Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

This sample was originally received on 5/30/19 at 10:20; we received a request for a re-extraction from R. Morris of Olin on 6/21/19.

[1] = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19171009	06/22/2019 21:18	Danielle D McCully	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19171009	06/20/2019 15:45	Isaac Phillips-Cary	1

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Quality Control Summary

Client Name: TestAmerica
Reported: 07/19/2019 12:46

Group Number: 2052690

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ng/l	LOQ ng/l
Batch number: 19171009	Sample number(s): 1097483	
NEtFOSAA	N.D.	3.0
NMeFOSAA	N.D.	3.0
Perfluorobutanesulfonic acid	N.D.	1.0
Perfluorodecanoic acid	N.D.	2.0
Perfluorododecanoic acid	N.D.	2.0
Perfluoroheptanoic acid	N.D.	1.0
Perfluorohexanesulfonic acid	N.D.	2.0
Perfluorohexanoic acid	N.D.	2.0
Perfluorononanoic acid	N.D.	2.0
Perfluorooctanesulfonic acid	0.40 J	2.0
Perfluorooctanoic acid	N.D.	1.0
Perfluorotetradecanoic acid	N.D.	1.0
Perfluorotridecanoic acid	N.D.	1.0
Perfluoroundecanoic acid	N.D.	2.0

LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19171009	Sample number(s): 1097483								
NEtFOSAA	5.44	5.98	5.44	6.77	110	124	55-169	12	30
NMeFOSAA	5.44	5.54	5.44	5.71	102	105	44-147	3	30
Perfluorobutanesulfonic acid	4.81	4.49	4.81	4.54	93	94	73-128	1	30
Perfluorodecanoic acid	5.44	5.42	5.44	5.12	100	94	69-148	6	30
Perfluorododecanoic acid	5.44	5.59	5.44	5.34	103	98	75-136	5	30
Perfluoroheptanoic acid	5.44	5.50	5.44	5.78	101	106	76-140	5	30
Perfluorohexanesulfonic acid	5.14	4.67	5.14	4.80	91	93	71-131	3	30
Perfluorohexanoic acid	5.44	5.26	5.44	5.53	97	102	75-135	5	30
Perfluorononanoic acid	5.44	5.10	5.44	4.90	94	90	72-148	4	30
Perfluorooctanesulfonic acid	5.20	4.81	5.20	4.78	92	92	67-138	1	30
Perfluorooctanoic acid	5.44	5.34	5.44	5.29	98	97	72-138	1	30
Perfluorotetradecanoic acid	5.44	5.64	5.44	5.01	104	92	74-135	12	30
Perfluorotridecanoic acid	5.44	6.02	5.44	5.24	111	96	61-145	14	30
Perfluoroundecanoic acid	5.44	5.67	5.44	5.89	104	108	75-146	4	30

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: TestAmerica
Reported: 07/19/2019 12:46

Group Number: 2052690

Labeled Isotope Quality Control

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS
Batch number: 19171009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
1097483	86	89	99	91	89	77
Blank	79	77	80	79	79	80
LCS	77	88	89	84	88	82
LCSD	75	74	74	72	72	72
Limits:	26-148	35-138	34-126	35-126	48-122	50-121

	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1097483	73	73	66	80	71	81
Blank	83	74	89	80	81	76
LCS	91	82	89	93	85	78
LCSD	79	78	71	76	77	76
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA
1097483	87
Blank	78
LCS	78
LCSD	80
Limits:	26-119

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

2052690 / 1097483

1042 / ~~204639-1~~ / ~~1069020-25~~ @K224 7/10/19

wood.

Wood Environment and Infrastructure, Inc.
511 Congress Street
Portland, ME 04101
(207) 775-5401

SHIP TO:
Lancaster Lab
2425 New Holland Pike
Lancaster, PA 17601
Attn: Lynn Frederiksen
Lab Phone# (717) 656-2300

CHAIN OF CUSTODY

DATE: 5/29/2019
COC #: Olin190529A
PAGE: 1 OF 1

Project Name:	Olin Wilmington	Project Contact:	Tige Cunningham or Chris Mazzolini	Bill To: **TestAmerica**	Disposal Instructions: LAB
Project Number:	6107190016	Phone Number:	Tige = (207) 329-0164 Chris = (339) 927-3796		Shipment Method: FEDEX
Project Manager:	Libby Bowen	Project Phase:	001.07	Release Order must be noted on all invoices	Waybill Number: N/A

Sample Information

No.	Sample ID	Date & Time Sampled	Matrix	Sample Type	MS/MSD
1	OC-GW-10DR-XXX	05/29/19 14:20	GW	N	N
2	OC-GW-305-XXX	05/29/19 10:14	GW	N	N
3	OC-GW-307-XXX	05/29/19 13:18	GW	N	N
4	OC-MP-1 #14-XXX	05/29/19 09:05	GW	N	N
5	OC-MP-1 #1-XXX	05/29/19 11:30	GW	N	N
6	OC-MP-1 #4XXX	05/29/19 10:20	GW	N	N
7					
8					
9					
10					
11					
12					

Methods for Analysis

No.	PFAS (537) Lancaster (2) 250mL HDPE	Repeat w/ 10mL aliquot as dissolved	between R. Morris @ Olin and C. Neslund @ ELLE, 6/21/19.	LF593 7/10/19	RUSH STD (2 Week)	TOTAL BOTTLES	HOLD All Analyses
1	X				X	2	
2	X				X	2	
3	X				X	2	
4	X				X	2	
5	X	X			X	2	
6	X				X	2	
7							
8							
9							
10							
11							
12							

Sampler's Signature: elizabeth penta	Elizabeth Penta	Date: 05/29/2019	Time: 16:00
Relinquished By/Affiliation: elizabeth penta	wood	Date: 05/29/2019	Time: 16:00
Received By: FedEx		Date: 05/29/2019	Time: 16:30
Relinquished By/Affiliation:		Date:	Time:
Received By:		Date:	Time:
Relinquished By/Affiliation:		Date:	Time:
Received By (LAB):		Date: 5/30/19	Time: 1020

For Lab Use

Does COC match samples:	(Y) or N
Broken Container:	Y or (N)
COC seal intact:	(Y) or N
Other problems:	Y or (N)
WSDOT contacted:	Y or N
Date contacted:	
Cooler Temperature at receipt:	3.3 °C

Comments:
X=Analyze H=Hold Analysis Request

Please See PO# REWI0025 for invoicing
TAL Project # = 48006612

NUMBER OF COOLERS SENT: 1

Deliverables: Level 2, Level 4 and EQUIS EZ EDD

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Sample Administration Receipt Documentation Log

Doc Log ID: 250260

Group Number(s): 2052690

Client: Wood Environmental and Infrastructure

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	05/30/2019 10:20
Number of Packages:	1	Number of Projects:	1
State/Province of Origin:	ME		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	N/A
Samples Chilled:	Yes	Total Trip Blank Qty:	0
Paperwork Enclosed:	Yes	Air Quality Samples Present:	No
Samples Intact:	Yes		
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

Unpacked by Simon Nies (25112) at 15:57 on 05/30/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-03	3.3	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425
T | 717-656-2300
F | 717-656-2681
www.LancasterLabs.com

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.